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ABSTRACT

The reliability of using peers in drill type instruction was investigated with 57 students (in grades 4 through 8). Quality of tutor-student interaction during multiplication drills was based on the pace or rate at which students interacted with the material and the accuracy level at which they performed. Ss were instructed to listen to cassette tapes of an individual giving answers and were asked to mark with a pencil the problems on the probe sheet for which they heard a mistake. Almost 94% of the errors were identified by students functioning at their own rate and 96.8% of the errors were identified by students functioning at or below their own rate. (Appended are a sample screening device, probe sheets, and a paper titled "Using Peers for the Delivery of Instruction" by C. Sanders.) (SBH)

THE RELIABILITY OF USING PEERS IN DRILL TYPE INSTRUCTION

Session 135

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CEC Convention

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With the increased use of paraprofessionals for the delivery of instruction, there has been a proliferation of peer tutor programs along with a marked increase in research into the use of peers for the delivery of instruction and reinforcement. Popular articles have promoted the widespread use of peer mediated instruction (PMI), but have often failed to inform the classroom teacher of the necessary characteristics of a productive tutoring situation and have frequently not addressed themselves to the issues of instructional control. The existing literature on PMI examines two kinds of situations - those where students deliver instruction and those where students act as reinforcing agents.

The literature abounds with studies which have conflicting implications but there is some agreement at this time regarding the advantages and disadvantages of PMI. Lippitt and Loman (1965) noted gains made by the tutor. Cloward (1967), when investigating the performance of tenth and eleventh graders in a remedial reading situation, also noted greater gains by the tutors than by the controls. Vernon and Feldman (1973) examined the performance difference of low achieving students who taught lessons on some days and only studied lessons on other days. They concluded that having a student function as a person who delivers in-

struction is a useful remedial technique. Kaplan (1972) compared the reading performance of fourth, fifth, and sixth graders who acted as tutors. His findings indicate that if the tutor and tutee are matched according to their skills on the task being taught, that both the tutor and tutee will improve on the task.

A recent comprehensive article in the Review of Educational Research, surveying the current literature on PMI, critizes the unsystematic approach taken by most researchers and points to the necessity for identifying the critical issues and problems based upon theoretical considerations. Studies to date have investigated the efficacy of tutoring situations but only a few have examined the issues.

The issue we chose to focus on is that of instructional control. Rosenbaum (1973) states that instructional control is the ability to sense the circumstances of the learner. In sensing the circumstances of the learner, there is a need for monitoring interaction of the student with the material. Too often we are satisfied when we percieve that the student is interacting with the material. Interaction is not sufficient for learning to occur. The student must interact at a quality level. This quality level will be determined by the kinds of lessons or skills being taught. For example: If one were teaching the existential conflicts within the Christian/Judeo philosophy in the twentieth century, one

would be dealing with a complex lesson and would have an entirely different set of indicators than those identified for our study.

In our study, the two indicators and issues examined were those of pace and accuracy. When dealing with a basic skill such as a tool movement, the pace or rate at which students interact with the material and the accuracy level at which they perform are critical indicators of the quality of the interaction.

Recent studies indicate that the pace and accuracy of student responses are critical to the aquisition of tool movement skills. Reaching a level of competency - performance without gaps between responses and without errors in the tool movement, requires drill. In a drill type instructional situation one tries to elicit a high frequency of responses.

There are various techniques and approaches to drill instruction. Programmed textbooks and teaching machines are widely used. Disadvantages include high cost, student motivation and the fact that prepared materials may not serve the needs of the learner. Another and more traditional approach to drill instruction is the teacher/student - tutor/tutee situation. The advantages of low cost and availability of students to teach students led us to investigate two issues in tutor/tutee drill instruction. We asked the following

questions:

1) Does the tutor know when to intervene?

2) Is the tutor competent to intervene?

Knowing when to intervene and being competent to intervene requires that the student be able to identify when a mistake has been made. The study I will discuss addressed itself to this issue and to these questions.

Students who do not know how to do a task learn when they teach. Recognizing this we wanted to assertain what level of competence a tutor had to had to have in order to effectively monitor a drill type situation which included the features of pace and accuracy as necessary characteristics. We wanted to find out how much a kid had to know in order to effictively monitor a task.

Since we were responsible for teaching students to multiply facts, 0-9, before they could be mainstreamed, we chose to look at competency for multiplcation facts and circumstances surrounding a quality instrucional situation.

A pilot study was completed to establish the criteria for acceptable performance on multiplication facts at the school in which we work. The students for the pilot were eighth graders who according to their teachers "knew their facts well." The mean rate for these students was sixty facts per minute with two or fewer errors. These students were screened on the probe that was used for the study later. A copy is included in the appendix. Problems were randomly

selected and students in both the pilot and the study took three one minute timings. After sixty per minute was established as the rate for kids who could do multiplcation facts, rates of fifteen per minute and thirty per minute were chosen arbitrarily as rates of students who were functioning at rates less than mastery. (Based on work by Haughton (1972) we projected that these rates differentiate between students who had just begun to learn to multiply and those who were at a higher stage of aquisition of the skill.)

In the study we screened 600 fourth through eighth graders on the device used in the pilot. The students took three one minute timings, scores were averaged, and fifty-seven students were identified at the following rates. nineteen at 15per minute, nineteen at 30 per minute, and nineteen at 60 per minute. These fifty-seven students were individually given probe sheets which contained multiplication problems. The problems were randomly selected and contained facts from zero through nine. Students were instructed to listen to cassette tapes of an individual giving answers and were asked to mark with a pencil the problems on the probe for which the heard a mistake.

We assumed that identification of errors precedes production of correct responses but did not know how competent to identify errors the groups of students were.

Each tape and probe sheet combination contained one-third errors.. Students listened to tapes at sixty responses per minute, thirty responses per minute, and fifteen responses per minute. The sixty per minute tape contained twenty erors,

Each tape and probe sheet combination contained one-third errors. Students listened to tapes at sixty responses per minute, thirty responses per minute, and fifteen responses per minute. The sixty per minute tape contained twenty erors, the thirty per minute contained ten errors and the fifteen per minute contained five. In order to provide an opportunity for students to identify the same number of errors at each rate, the students listened to and marked one sixty per minute probe sheet combination, two thirty per minute probe sheet combinations and four fifteen per minute probe sheet combinations. Each had seven tape probe combinations. (60 errors and 180 problems) See appendix for probes.

The tape probe combinations were presented in a Latin square design to control against practice effect.

Results - Each of the fifty-seven students had a chance to identify 20 errors at each of the three rates. The total nimber of error discriminations for each group at each rate was 1,140. Table I summarizes the behavior of each group. Notice. 93.9% of the errors were identified by students functioning at their own rate and 96.8% of the errors were identified by students functioning at or below their own rate.

The significance of the results of this study depends on a teacher's response to the following question:

Would you use a monitoring device which will stop a

student 96.8% of the time s/he makes an error? If one decides to use such a method then one should consider the manner in which one would set up a peer mediated instruction system. Connie Ann Nygaard Sanders will discuss the critical components of such systems.

TABLE 2

PERCENTAGE OF ERRORS IDENTIFIED

SUBJECT RATE	TAPE RATE 15	TAPE RATE 30	TAPE RATE 60
15	$\frac{330}{380}$ = 86.8%	$\frac{296}{380}$ = 77.8%	$\frac{128}{380}$ = 33.6%
30	$\frac{377}{380}$ = 99.2%	$\frac{371}{380}$ = 97.6%	$\frac{188}{380}$ = 49.4%
60	$\frac{380}{380}$ = 100%	$\frac{379}{380}$ = 99.7%	$\frac{369}{380}$ = 97.7%

Students	Errors recognized
All	$\frac{2818}{3420}$ = 82.4%
At the same rate	$\frac{1070}{1140}$ = 93.9%
At the same rate or below	$\frac{2206}{2280}$ = 96.8%

APPENDIX

SCREENING DEVICE

1 X 0 =	1 X 5 =	0 X 1 =	9 X 1 =	6 X 9 =	1 X 4 =
2 X 2 =	4 X 6 =	2 X 5 =	8 X 9 =	2 X 7 =	5 X 3 =
2 X 4 =	4 X 8 =	2 X 2 =	6 X 4 =	1 X 5 =	2 X 4 =
4 X 2 =	9 X 3 =	0 X 6 =	1 X 6 =	3 X 9 =	5 X 3 =
3 X 7 =	3 X 9 =	8 X 1 =	9 X 1 =	6 X 0 =	8 X 1 =
7 X 7 =	0 X 6 =	1 X 1 =	5 X 3 =	1 X 8 =	7 X 0 =
9 X 9 =	7 X 2 =	5 X 6 =	3 X 1 =	7 X 1 =	1 X 8 =
9 X 6 =	9 X 1 =	0 X 5 =	2 X 0 =	9 X 4 =	5 X 6 =
8 X 9 =	1 X 4 =	6 X 3 =	1 X 8 =	5 X 7 =	8 X 4 =
8 X 5 =	3 X 6 =	5 X 3 =	5 X 9 =	3 X 8 =	6 X 2 =
6 X 9 =	2 X 7 =	1 X 5 =	3 X 9 =	6 X 0 =	1 X 8 =
7 X 1 =	9 X 4 =	5 X 7 =	3 X 8 =	1 X 4 =	5 X 3 =
2 X 4 =	5 X 3 =	8 X 1 =	7 X 0 =	1 X 8 =	5 X 6 =
8 X 4 =	6 X 2 =				

PROBE 1

0 X 4 5 X 0 1 X 5 2 X 0 1 X 6 1 X 6 9 X 1 4 X 1

2 X 3 6 X 5 5 X 5 5 X 3 0 X 9 9 X 1 7 X 9 3 X 4

4 X 1 8 X 3 2 X 5 7 X 2 6 X 3 4 X 8 5 X 1 4 X 8

2 X 1 3 X 0 6 X 2 1 X 6 7 X 8 6 X 3 9 X 4 3 X 5

7 X 5 9 X 9 1 X 8 6 X 6 6 X 1 1 X 7 0 X 4 1 X 3

7 X 9 6 X 9 1 X 0 2 X 7 7 X 7 3 X 4 8 X 6 0 X 6

9 X 5 2 X 9 6 X 4 9 X 9 8 X 8 1 X 0 1 X 1 8 X 7

6 X 3 1 X 9 5 X 4 7 X 9

PROBE 2

4 X 8	0 X 1	6 X 4	5 X 3	0 X 1	6 X 4	1 X 7	1 X 9
3 X 6	5 X 7	5 X 9	3 X 9	9 X 9	1 X 9	9 X 8	4 X 0
1 X 3	3 X 6	5 X 2	2 X 6	3 X 9	8 X 0	1 X 7	8 X 3
1 X 6	0 X 9	2 X 4	6 X 8	8 X 5	3 X 7		

PROBE 3

5 X 7	9 X 7	8 X 3	6 X 5	1 X 2	7 X 3	4 X 6	3 X 0
9 X 2	9 X 0	0 X 0	7 X 5	4 X 9	5 X 0	6 X 5	7 X 5
5 X 6	9 X 0	4 X 2	9 X 9	8 X 7	0 X 1	1 X 9	7 X 3
3 X 0	9 X 7	4 X 6	9 X 7	8 X 7	9 X 2		

PROBE 4

5 X 7	3 X 4	6 X 6	2 X 8	4 X 5	1 X 0	7 X 4	3 X 7
4 X 7	8 X 5	3 X 4	9 X 8	0 X 6	5 X 3	8 X 6	

PROBE 5

4 x 0	1 x 1	3 x 6	1 x 1	4 x 7	4 x 6	7 x 9	9 x 4
6 x 8	7 x 3	9 x 5	9 x 3	9 x 5	9 x 8	8 x 2	

PROBE 6

3 X 0	6 X 0	2 X 7	6 X 5	9 X 3	0 X 9	7 X 9	3 X 0
6 X 7	9 X 3	4 X 3	8 X 0	5 X 6	7 X 6	4 X 0	

PROBE 7

7 X 0	7 X 5	3 X 7	5 X 6	2 X 1	8 X 2	6 X 8	0 X 5
2 X 1	0 X 7	0 X 8	5 X 1	5 X 6	9 X 8	0 X 2	

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Session 135

Using Peers for the Delivery of Instruction

Participant- Connie Ann Nygaard Sanders

Part Three, Monitoring the Interaction Between Tutors and Tutees.

When a teacher gives up direct control of the instructional situation to student tutors, consideration must be given to how intervention will take place between the tutor and tutee. The ability to intervene appropriately when the person being instructed makes an error depends on two components. These are: 1) the ability to intervene fast and 2) the ability to intervene correctly. Both of these components of intervention can be handled by peers when the task is set up in a simple, drill-type format.

This drill format should supply the tutor with defined, step by step procedures which indicate what to do in the event of an error, as well as guiding the tutor and tutee to the correct answer. Such a guide involves a deductive process that must be fool-proof in that there can be no error in arriving at the one correct answer. Ideally there is only right or wrong with respect to the response. Such instructional control leaves nothing to the interpretation of the tutor. When the tutee responds, the tutor knows immediately if the answer is right or wrong by comparing it to the answer on the instructional guide.

A flow chart can function as the tutor's guide for instruction. There should be no more than two loops in the flow chart. The loops lead to the correct answer and the last loop should make the answer obvious. The procedure could

therefore be to guide the students to a resource which gives the correct answer. The tutor follows the procedure and then goes directly back to the task. We now have an instructional interaction taking place between the tutor and tutee, with the tutor following an instructional guide such as a flow chart. The flow chart is in front of the tutor for his/her reference during instruction. See figure 1.

It cannot be assumed that this instructional interaction will automatically be productive. The belief that children communicate better with other children than adults do is not necessarily true. Because of this monitoring of the interaction is essential.

There are two ways to monitor the instruction between peers. One is the process orientation and the other is the product orientation. When looking at the instructional process it may be advantageous to note a group of setting characteristics and good instructional behaviors which have been corrolated with higher achievement. These are: 1) the amount of time spent on the study task, 2) instruction should be rapidly paced, 3) the materials used in the instruction should relate to meeting the objectives and 4) the feedback from the instructor should be rapid, appropriate and positive. A sample of the behavioral interaction between tutor and tutee can then be taken to determine what quality of process is taking place. This sample will pinpoint those particular behaviors the tutor should have as determined by his/her teacher.

One system which has been devised for summarizing process behaviors is shown in figure 2. (Kaplan, 1976) Such a device indicates if the tutor is on-task and if s/he is duplicating those characteristics the teacher has pinpointed. Three qualities of this form are that it: 1) gives feedback to the teacher, 2) gives the tutor input on his/her performance and 3) allows the teacher to compare what happens in the instructional setting which might affect reaching the objective.

Because evaluation of the process of instruction looks at instructional behaviors, we are only assuming that these behaviors have a realationship with how a kid learns and we may be wrong. Therefore a product evaluation is desirable. Product evaluation observes the results of instruction - Is the tutee meeting those objectives the teacher has set for him/her?

The best systems for procuct evaluation, and there are many, take direct and frequent samples of the objective behaviors. For example, daily testing with probe sheets or critereon referenced tests can be used. The contents of the probes is presented in a variety of ways so as to avoid student memorization. Starting the daily evaluation in a different place each time it is given or using comparable forms are ways that vary the presentation. See figure 3.

Once direct samples have been taken, they should be summarized. The method used with these kinds of probes is charting. It should be noted that figure 4 is not an equal interval chart, but has been used successfully with

students just learning to chart. Complete information on probe and chart systems is available in White and Harring's Exceptional Teaching.

The optimum monitoring system would involve both the process and product evaluation. This would insure the greatest control of the peer instruction situation.

A study entitled "Monitoring the Use of Peer Tutors" (Howell and Kaplan, 1977) asked the question - can the use of peer tutors increase a student's reading rate? Fifteen students in grades 3-5 were randomly picked for three groups in the study. Tutors, tutees and controls made up the three groups. The investigators asked teachers for their "below-average" students and these students were given the Gilmore Oral Reading Test. No significant differences existed between the groups with regard to age, basal reading level, oral reading rate or grade level.

Data was collected during eighteen school days; nine days of baseline and nine days of intervention phase. The results indicated that the use of peer tutors can increase the oral reading rate of tutees. The important part of the intervention involved the use of a procedure to monitor the interaction between tutor and tutee (figure 1) and give feedback to tutors on their performance. This device used to monitor peer-mediated instruction along with frequent measures of a tutee's performance on the objective tasks help insure the quality of instruction.

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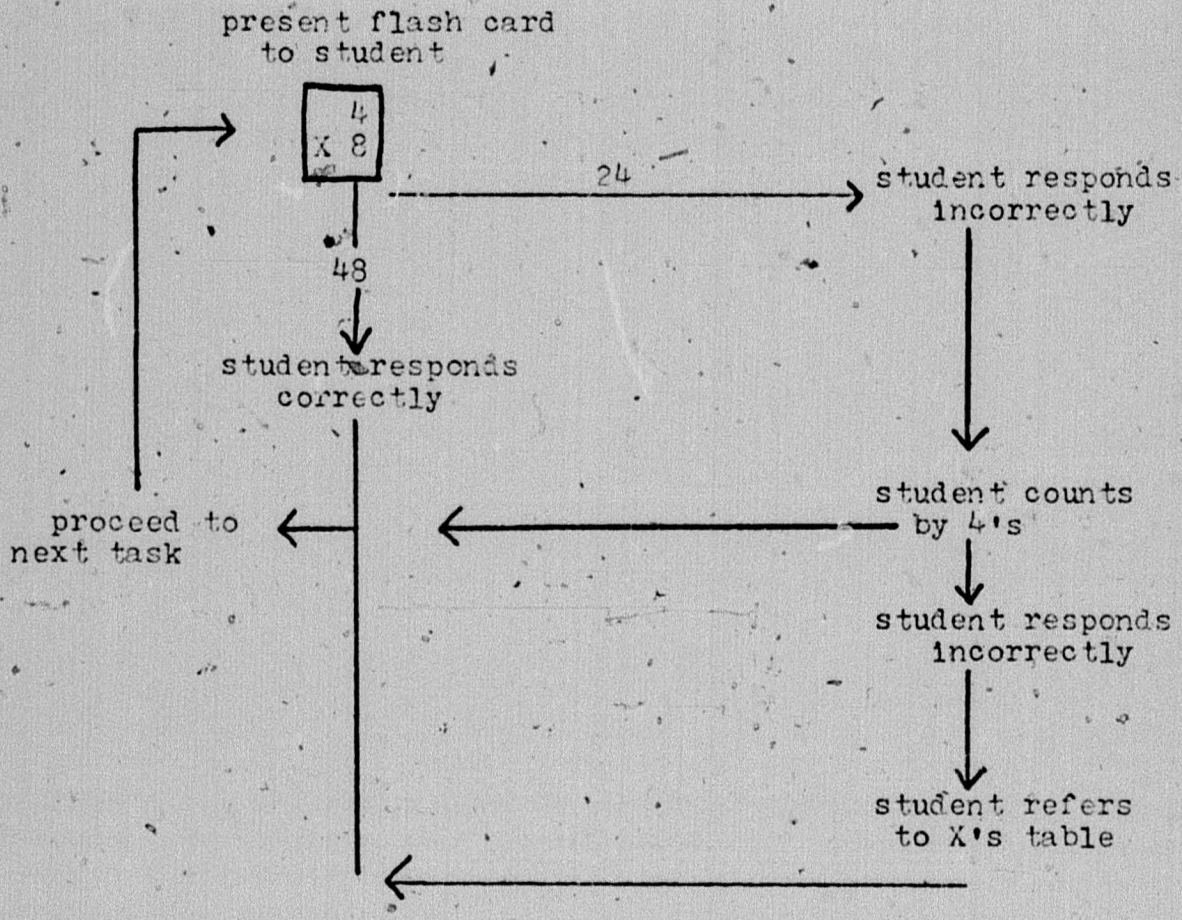


Figure 1-Example Flow Chart

Tutor Terri Grade 3 Teacher Karna Time ____ Date 5-17

Tutee Scott Grade 3 Teacher Chad Book 2nd

KEY: PTP-points to place
M -mistake
H -hesitation
* -tutor asks for help
TO -tutor ignores
P.O.-reads sentence over correctly
S+ -positive statement
TS -time sample (")
TA -tutor attends
TA -tutor attends incorrectly

PTP	M	H	P.O.	S+	TS (")	Comments
TA	TA	TA	—	TA	30 sec.	
TA	TA	TA	TA	TA	60 sec	mispronounced
TA	TO	TO	TA	TA	45 sec.	
TA	TA	TA	TA	TA	30 sec	

PTP... $\frac{TA}{TA + TO} = \frac{4}{4} = 100\%$

M..... $\frac{TA}{TA + TO} = \frac{3}{4} = 75\%$

H..... $\frac{TA}{TA + TO} = \frac{3}{4} = 75\%$

PO... $\frac{TA}{TA + TO} = \frac{3}{3} = 100\%$

S+... $\frac{TA}{TA + TO} = \frac{4}{4} = 100\%$

YOU NEED TO:

— good work

1. pick up the pace
2. He missed the word mistake
3. Say "good" when he reads a sentence over.

FIGURE 2 DAILY OBSERVATION SHEET

M-1

M-1

FACTS - PRODUCTS

Student _____ Total _____

Date _____ Week _____ Correct _____

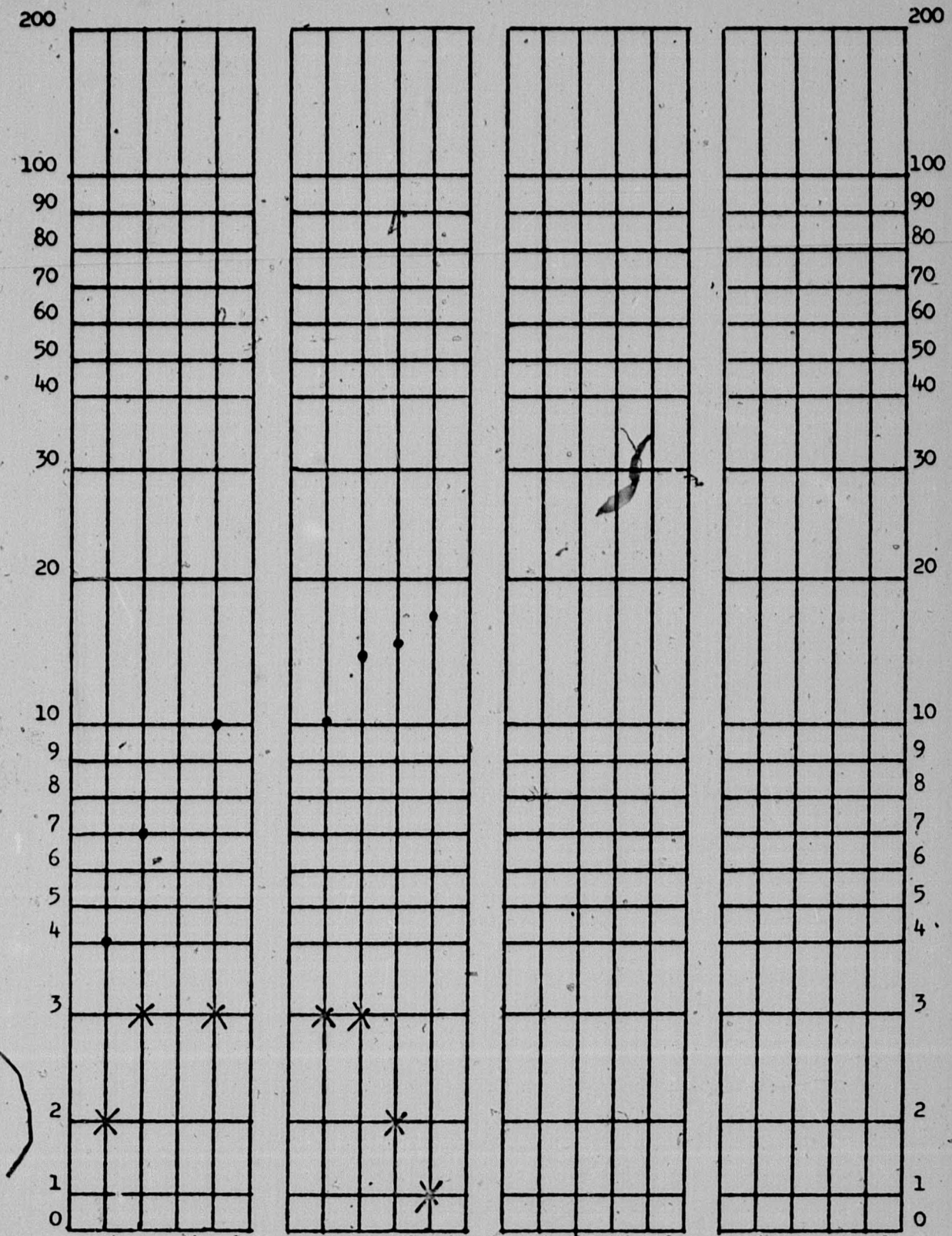
Teacher _____ Error _____

Minutes _____

0 - 0 - 8 - 0 - 1 - 0 - 6	0 0	5 0	8 1	8 0	1 1	3 0	6 1	(7)
0 - 6 - 0 - 2 - 4 - 0 - 4	7 0	3 2	4 0	2 1	2 2	2 0	4 1	(14)
0 - 8 - 3 - 0 - 0 - 8 - 0	9 0	4 2	3 1	0 0	5 0	8 1	8 0	(21)
9 - 5 - 0 - 6 - 0 - 2 - 4	3 3	5 1	7 0	3 2	4 0	2 1	2 2	(28)
- 7 - 9 - 0 - 8 - 3 - 0	6 0	7 1	9 1	9 0	4 2	3 1	0 0	(35)
1 - 0 - 6 - 0 - 9 - 5 - 0	1 1	3 0	6 1	1 0	3 3	5 1	7 0	(42)
4 - 0 - 4 - 0 - 7 - 9 - 0	2 2	2 0	4 1	6 0	7 1	9 1	9 0	(49)
0 - 8 - 0 - 1 - 0 - 6 - 1	5 0	8 1	8 0	1 1	3 0	6 1	1 0	(56)
6 - 0 - 2 - 4 - 0 - 4 - 0	3 2	4 0	2 1	2 2	2 0	4 1	6 0	(63)
8 - 3 - 0 - 0 - 8 - 0 - 1	4 2	3 1	0 0	5 0	8 1	8 0	1 1	(70)

Figure 3- Example Probe

Figure 4-Example Chart



Correct (.)
Error (x)

Page/Probe _____
Date _____

Student _____ Grade _____ Teacher _____ Subject _____